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Information

The Bedside Sherlock Holmes

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There are a multitude of diagnostic clues contained in clothing, jewelry, possessions and other extracorporeal attachments that each patient brings with him or her to a physician. Because of the emphasis of classic physical diagnosis on the body of a patient solely, and because of modern practices that may have patients stripped of these articles before the first encounter with their physician, these interesting and enlightening findings are often ignored or unavailable. Incorporation of these observations into the panoply of data obtained from the history and physical examination will enhance both the accuracy and adventure of differential diagnosis. Such exercises in observation, moreover, may increase general physical diagnostic skills as well as enliven bedside rounds.

SHERLOCK HOLMES: *"Let him, on meeting a fellow mortal, learn at a glance to distinguish the history of the man and the trade or profession to which he belongs. By a man's finger-nails, by his coat-sleeve, by his boot, by his trouser knees, by the callosities of his forefinger and thumb, by his expression, by his shirt cuffs—by each of these things a man's calling is plainly revealed."*

JOHN H. WATSON, MD: *"What ineffable twaddle!"*

A. CONAN DOYLE
A Study in Scarlet

An emergency room physician is often confronted with a patient who can give no history: a coma or aphasia victim; one who speaks a language unfamiliar to the physician; a person in a toxic condition, or a confused, mute or manipulative man or woman. In such circumstances we are most aware that a good history is the bedrock of the diagnostic process.[1] But even in calmer situations than emergency room encounters, experienced clinicians know that the keener one's physical observations, even from the first instant of patient contact, the better the historical questions asked.[2] Conversely, the history signals the clinician what to look for on physical examination.

We physicians are trained in a systematic, logical approach to physical diagnosis of the human body. Unfortunately, the conditions under which such examinations may occur can exclude a variety of invaluable observations that provide clues to a patient's state. In a busy contemporary office practice, the first meeting between a patient and physician may be with the patient already stripped and gowned to save time. In hospitals, an almost invariable initial feature in the process of admission is to whisk away a patient's property—clothes, jewelry, wallet or purse—for safekeeping. This robs a diagnostician of a rich

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source of physical evidence and may leave a house officer and medical student, in particular, unaware through their entire training of the value of these articles as repositories of information. The inattention to the usefulness of these aids to physical diagnosis is such that even when patients are in possession of their belongings at the time they are seen, the personal effects tend to be ignored.

Only occasionally alluded to in textbooks on physical diagnosis, scattered through the medical literature as letters to editors or buried as "pearls" in the body of larger articles, these bits of diagnostic acumen are not readily available in any systematized format. Over the years we and other clinicians have noted, but never to our knowledge organized, the multitude of clues available from unconventional sources. We attempt here a review to highlight some of these fascinating, at times enjoyable but little-celebrated, "extracorporeal" findings.

Clothing

A patient who arrives at the door of an emergency room in street clothes during daylight hours is less likely to be chronically ill than one who comes already clad in pajamas or nightgown. Transfer from another hospital is easily deduced if a patient is dressed in a hospital gown. People who bring suitcases with them to an emergency room anticipate admission; house staff recognize this as the *positive-suitcase sign,* said to be especially common in Veterans' Administration facilities.

The clothes a patient wears, and how they are worn, give clues to his or her socioeconomic status and cultural background, as well as state of health. An expensive-looking suit frayed at the edges may tell of a gradual decline in fortune. If all the labels in clothing are from a foreign country, recent immigration or travel may be assumed until otherwise contradicted. A victim's occupation may be pertinent to diagnosis and can sometimes be surmised from clothing: uniforms of all sorts are automatically revealing. Also of value are the characteristic stains on the clothing of a painter or butcher, the encrustations on a farmer, the soot of a coal miner, the smudges on a firefighter or the equipment belt of an electrician or carpenter.

The pattern of a man's tie may indicate his hobbies (tennis raquets, golf clubs, sailboats), club memberships and even occupational logos. A neck scarf on a woman may conceal her thyroidectomy or tracheostomy scar and broad-brimmed hats or long sleeves may suggest photosensitivity. Long sleeves inappropriate to the weather may also be used to cover the *track marks* of parenteral drug abuse or the scars of former suicide attempts.

A dominance of snaps and zippers in the place of buttons can reflect fashion, but also serves the utilitarian purpose of making dressing easier for those with loss of digital dexterity from arthritis or motor disease. Bizarre combinations of color in otherwise conservative clothing hint at color blindness in a man. In all of these assessments, however, an examiner must take into account the vagaries of American taste.

The degree of tidiness in which a person maintains his or her appearance may be simply a matter of habit or preference but can also reflect general well-being; people tend to be less attentive to their dress as they feel more ill.[3] A woman who took meticulous care with her clothes in the morning, for example, is less likely to have a debilitating chronic illness than an acute event that accounts for her admission to hospital that afternoon. The general fit of the clothes will tell of weight loss or gain, an important consideration in many diagnostic problems. Cerebral dominance (as in a stroke victim) may sometimes be inferred from the greater wear and tear on the shirt cuff on the side of handedness. A patient with hypothyroidism may be too warmly dressed for the weather, as one with hyperthyroidism is too lightly clad for the cold. Clothing may even contribute to the genesis of medical problems, as in an elderly person who is heavily bundled up in the summer and suffers heatstroke[4] or, the converse, a hypothermic sufferer from exposure with flimsy clothes.[5] Less dramatically, but important to a patient, a physician may counsel a woman with hiatus hernia symptoms to abandon her too-tight girdle.[6]

Perhaps most useful to an emergency room physician are the diagnostic usages of stains on the clothes of an unconscious patient. Blood stains immediately precipitate a search for their site of origin. The stains of vomitus are examined for color: the coffee-ground appearance of gastric bleeding is familiar to most doctors, as is bright red hematemesis. Red vomitus may also reflect regurgitation of a variety of red-colored foodstuffs (strawberry gelatin dessert, beets, port wine and so forth). A startling blue vomitus occurs

with iodine ingestion when the stomach contains carbohydrates.[7(p115)] The characteristic odors of vomitus and other excrement associated with certain disorders are discussed in the "Effluvia" section.

Underclothing should be examined for stains of stool and urine, which provide evidence of the color and odor of these, in some cases even when a patient is unable to produce a more adequate specimen for inspection. The presence of incontinence itself may be of clinical diagnostic importance and the quality of the incontinence material even more useful. A black stool stain can suggest melena, but can also reflect a patient's use of iron, charcoal, bismuth, black cherries[8] or even licorice ice cream.[9] Acholia may be diagnosed from the undershorts and, rarely, the silver stool of carcinoma of the ampulla of Vater (said to be an admixture of melena with acholic steatorrhea).[10] The dramatic smoking stools of yellow phosphorus poisoning are uncommon but of immediate import when they occur.[11]

Urine stains come in a variety of colors.[12-14] They may be red, as in hematuria and porphyria or the ingestion of pyridium, beets, phenolphthalein, aniline dyes or rifampin. Brown urine occurs with hemoglobinuria; myoglobinuria; methemoglobinuria; bilirubinuria, and the ingestion of phenol, cresol or phenylhydrazine. A black urine stain is the hallmark of alkaptonuria. Orange urine can be seen in patients who have eaten large amounts of rhubarb or senna or who are taking phenazopyridine hydrochloride (Pyridium). An extraordinary green or bluish urine may result from *Pseudomonas* infection or the use of indigo carmine, phenol, methylene blue or indigo blue dyes. Yellow-orange crystals in the diapers of children with Lesch-Nyhan syndrome may alert mothers and physicians of the infants to their uricosuria.[15]

Inspection of a handkerchief or paper tissues can convey the color and odor of sputum or tears. Both can be visibly yellow in a jaundiced patient. Anchovy or chocolate brown sputum suggests amebic abscess of the liver eroded through to lung.[16] Infected sputum may be green with *Pseudomonas,* rusty red with hemoptysis[7(p103)] or simply purulent yellowish grey. Red-tinged sputum, saliva and tears occasionally occur with the ingestion of rifampin.[17] Blood in the tears occurs with epistaxis, tumors of the lacrimal sac and with rare vicarious menses in women.[18] A feculent odor to sputum on a handkerchief suggests anaerobic lung abscess.

Sweat stains, especially in the axillary and inguinal regions, can be diagnostically helpful. Red-tinged sweat occurs in some patients taking rifampin and brown sweat may stain the clothes of patients with ochronosis.[19] The absence of sweat marks on the clothing of a patient with notable hyperpyrexia may suggest anhidrosis as a possible contributing factor to heat stroke.[20]

Small burn holes in the clothes occur in certain occupations such as welding or steelwork. Inattentive smokers also tend to burn their clothes. When the holes form in a necklace pattern around the collar, they are analogous to the *rosette sign* of skin burns caused by cigarettes when the smoker is "on the nod" from narcotics, alcohol or sedative abuse.[21] Obviously the location of evidence of violent trauma on clothing, such as bullet holes, slashes and powder burns, has forensic as well as immediate importance.

Inspection of the shoes is among the most revealing and least used of all aspects of diagnostic clothing analysis. As with other articles of clothing, shoes tell a story about their owner: work shoes on an accident victim, for example, suggest a different circumstance for an acute event than slippers, dress shoes, hunting boots or running shoes. The presence of one slipper and one shoe or of an open-toed shoe implies gout, trauma, other arthritis or bunions on the unshod foot. Shoes without laces, or laces undone, are more comfortable to an edematous or inflamed foot. Patients with Parkinson's disease or other motor limitation may simply lack the dexterity and flexibility to tie their shoelaces. A prosthetic shoe lift is a more obvious clue to a chronically shortened leg than simple inspection of a supine patient. The pattern of wear on the soles of shoes testifies to gait. For example, a rapid distinction between old and new hemiparesis in a patient in an emergency room can be achieved by examining the shoes, in which the differential wear of a long-standing limp is clear. Does a patient have a backache? A glance at new or very high-heeled shoes may solve the diagnostic mystery. In a patient with diabetes, the source of sepsis may be clarified by blood and serum stains seen on socks or by the presence of ill-fitting shoes.

Belts can be used to assess the rate and amount of weight change. Particularly telling are new belt holes made by a patient to allow for the expansion of the belly in ascites, for example, or the

diminution of girth in severe weight loss. The degree of wear around each belt hole, the recentness of new holes and cracks in the leather formed through long wear at a given girth allow a careful observer to estimate the rate of loss or gain.

With all clothing a caution must be given: A down-and-out patient, especially, may have obtained these articles at a second-hand shop. A clinician should not be led astray by diagnosing a disorder of the previous owner rather than of the current patient.

Jewelry

The amount of jewelry worn and its quality speak of both the economic status and the taste of the owner. Most observers know the obvious signs of marriage given by a wedding ring; fewer will recognize that the untanned area on the left fourth finger in a suicidally depressed patient, for example, may suggest that recent divorce or disillusionment motivated the desperate act. Loose rings, often wrapped with bandage or string to keep them on, tell of weight loss. Too-tight rings occur in edema and acromegaly. High school and college rings advise a clinician of a patient's educational level and club or organizational rings (Masons, Marine Corps and the like) of interests and past or present associations. It has been reported that black staining under a golden ring occurs in diabetes mellitus[22]; perhaps this more often is a clue about the metal than the patient wearing it.

Tie tacks, pins, medallions and cuff links tell of hobbies, clubs, education (Phi Beta Kappa) and even profession (American College of Physicians) and can provide a baseline for mental status examination. Medallions also give formal medical information, as may bracelets and anklets designed specifically for that purpose. Necklaces and medals may be all that testify to the religious beliefs of a critically injured or ill patient, should they wear a cross or Star of David. Family names, relationships and dates may be inscribed on medals, watches and bracelets. Copper bracelets suggest that a patient suffers from arthralgias or arthritis and believes that these talismans are therapeutic.

Few middle-class businessmen wear earrings, and their presence on a man bespeaks a certain life-style, as do nose rings in both men and women. Watches can, rarely, tell the time of an accident—the classic broken timepiece of detective fiction. Large numbers on the watch face suggest diminished acuity of vision in the owner. A braille watch face, when noticed, provides a readier answer to unresponsive pupils in a comatose patient than extensive neurologic testing. A hearing aid similarly alerts a clinician to decreased hearing in a patient and implies a chronic rather than acute hearing loss.

Wallet, Purse and Pocket

In an unconscious or delirious patient, exploration of personal effects (best done with a witness present) to establish identity is common practice in emergencies. For a trained observer, careful consideration of the contents of wallet, purse and pockets can yield much of both diagnostic and therapeutic benefit. Likewise, the physician who does a "wallet biopsy" for alert patients, with their permission and in their presence, can be rewarded with valuable information.

The implications are obvious if a patient bears a medical information card, doctor's appointment slip or health organization membership card. Prescription and over-the-counter drugs tell part of a patient's history and may, by their side effects, contribute to a user's current distress. Chewing tobacco can correlate with hypertension, hypokalemia and other signs of mineralocorticoid excess,[23] as can large amounts of licorice candy[24]; both contain glycyrrhizic acid, structurally similar to aldosterone. Licorice myopathy and myoglobinuria have also been reported.[25] Patients with diabetes or periodic hypoglycemia may carry a purse full of candy bars or sugar packets. Cigarettes in purse or pocket hint at the cause of respiratory distress or malignant weight loss. Snuff can cause oral cancer,[26] and the discovery of a pipe or cigarette holder that a patient habitually tightly clenches in his teeth may explain temporomandibular joint pain.[27]

Letters and notes give an idea of a patient's social status and often of the person's state of mind. Handwriting can provide a clue to disease, as in the micrographia of Parkinson's disease[28] or the disarray of the script of the patient with hyperthyroidism.[29] Dated tickets and receipts will tell where patients have been and what they have been doing. A chronically ill person is unlikely to have recently attended a rock music concert, for example. Is there more food on a grocery receipt than seems plausible for one person?—perhaps the unconscious person has a large family. Has he or she a bill from a liquor store?—perhaps alcohol is a problem. A checkbook will provide

a running chronicle of activities over a period of several weeks and may even contain the victim's personal physician's name. Travel tickets and passports will tell where one has been, and numerous automobile, hotel or airline credit cards suggest frequent travel.

The driver's license with its photograph and record of height and weight give a patient's status at the date of issue of the license (although consideration should be given to the fact that some persons will declare a less than true weight to a clerk at a department of motor vehicles). Family and personal photographs are often carried in wallets and can alert a clinician to the presence of possible ancillary historians and provide a comparative appearance to assess a patient's current state. This may provide a diagnosis of acromegaly, for example. Photographs of family pets and hunting and fishing licenses can be helpful in the consideration of certain zoonotic diseases.

Union cards and club memberships offer a perspective of a patient in society. Even a social security card is informative. The first digit of the social security number denotes where it was issued: if a 0, for example, the card was issued in the Northeast; if a 1, in the Mid-Atlantic states; 2 and 3 signify Southeast or Midwest; 4 prefaces cards issued in the Southwest and southeastern states; 5 marks the Plains states and the Far West. If the first digit is a 7, the owner of the card was associated with the railroads. If 9 is the first number, the patient had been adjudged disabled or blind.

Makeup

The presence or application of makeup in a woman generally bespeaks wellness or at least improvement, if she's been sick, in her sense of well-being.[30] The heavy use of eyebrow pencil may obscure the loss of eyebrow hair in hypothyroidism,[31] leprosy,[32] syphilis,[33] or lupus erythematosus.[34] The care with which makeup is applied indicates motor coordination. The hemiagnosia of a stroke victim may be evident by the confinement of makeup to half the face. Horner's syndrome may present as running of makeup only on the unaffected side of the face on a very hot day. Bizarre or excessive makeup suggests a less than conservative personality or occupation, or even a disordered mental state.

The recency of a woman's hairdo or hair tint attests to the last time she felt reasonably well. Most depressed people do not have the motivation, nor can a chronically ill woman tolerate the time and noxious odors of a beauty shop or self-applied preparations. The length the hair has grown out since a procedure provides a rough estimation of the duration of sickness. The use of a wig in either sex may be a cosmetic convenience or may cover the alopecia of a number of disorders from stress to cancer chemotherapy.

Fingernail polish is informative. A fingernail normally grows at a rate of about 0.1 mm a day.[35] The distance between the base of the nail and the line of polish gives an approximation of the time of application—that is, when the patient felt well and steady enough to paint it on. Toenail polish speaks to a certain physical flexibility on the part of a patient, if she applied it herself, or to the existence of a friend or relative who applied it for her. Picking at nail polish is evidence of nervousness.

Perfume can be used to cover over unpleasant body odors (see below) but in the absence of use as camouflage can often be taken as a sign of subjective well-being.

The Bedside Table

An initial exercise in physical diagnosis for medical students has a senior clinician taking a group to a patient's bedside and asking them each to describe what they see. Almost invariably the students focus their attention exclusively on the patient, neglecting the tattle-tale survey of suspended bottles for intravenous administration, medication sheets and bedside table. Consider the difference in estimating the educational level of a patient who has only comic books, as opposed to a Dostoevsky novel, by the bedside. Technical journals reveal occupations and interests. Bibles are ubiquitous and may or may not reflect deep convictions in a patient. Photographs and greeting cards tell of family and friends and generally imply a hospital stay of more than a few days. Large amounts of hair clinging to a brush or comb indicate hair loss through disease or stress. Even when cigarettes or ashtrays are not visible, nicotine stains on dentures at the bedside attest to long-standing habituation to smoking. That the teeth are at the bedside and not in the patient's mouth should elicit an inquiry about their fit. Elderly persons with poorly fitting dentures can have this as the sole cause of profound weight loss. The mandibular growth of acromegaly can cause false teeth to be malaligned and so removed

from the mouth. And just feeling terribly ill may lead a patient to neglect putting in the dentures.

An alert student will sometimes diagnose cataract extraction from eyeglasses lying on the table, and a broken pair of glasses can go a long way toward explaining confusion in some elderly patients.

Sourball candies in a jar at the bedside are common with patients on the protein-restricted diets of hepatic or renal failure and have been reported as a sign of xerostomia in Sjögren's syndrome.[36]

Effluvia

The odor of a patient can be diagnostically useful.[37-39] A number of hereditary metabolic diseases in children can be suggested by the odor of a child or his excrement.[39] In adults hepatic failure sometimes generates a musty, sweetish smell, the fetor hepaticus. Care should be taken in diagnosing uremia to be certain a patient has not voided on himself to account for the uriniferous odor about him. The sweet aroma of acetone is a useful, if inconstant, concurrent of ketoacidosis. The sweat of schizophrenic patients reportedly has a characteristic odor.[40] Typhoid victims are said to smell like freshly baked bread and patients with diphtheria to exude a sweet breath.[37] A foul or feculent aroma may mark intestinal obstruction, esophageal diverticulum, lung abscess or intranasal foreign body.[38,41] Strong or offensive body odor may be associated with the increased sweating and skin oiliness of acromegaly[42] or the prohibition of deodorants that is part of the therapy for hidradenitis suppurativa.[39]

Bad halitosis occurs in dental disease, trench mouth and amphetamine abuse.[38] Other drugs can be betrayed by their odors: the bitter-almond odor of cyanide; the fruity, penetrating smell of chloral hydrate or paraldehyde[38]; the garlic smell engendered by the ingestion of yellow phosphorus,[11] arsenic, tellurium and selenium[43] or parathione,[38] among others, and the medicinal odor of penicillin. An odor of violets in the urine suggests turpentine poisoning[38] and it has been reported that urine odor can distinguish prerenal azotemia from acute tubular necrosis: in the former, the urine smells like concentrated urine and in the latter more like stale water.[44] The odor of alcoholic beverages is highly suspicious to clinicians, but may be obscured by the cover odor of breath mints[45] taken to disguise this evidence of alcohol use.

Whether a patient with an internal malignancy can indeed, as the ward saying has it, "smell like a cancer" begs investigation, but the necrosis of external malignant lesions can clearly give rise to disagreeable odors.[37]

Conclusions

Over centuries of medical practice, physicians have used extracorporeal diagnosis with as much enthusiasm as they have corporeal physical diagnosis. Though especially valuable in an uncommunicative or unconscious patient, extracorporeal clues can also stimulate a physician to diagnostic hypotheses in an alert patient. In these times of greater distance between patients and physicians, the loss of house calls, with their vast opportunities for extracorporeal observations, and the often automatic denudation of our patients before their first physician encounter, attention to these supplemental diagnostic techniques has waned. Because of this we fear that not only will their value be lost but, as great a pity, their fun as well.

We have no doubt omitted mention of many extracorporeal clues. Moreover, because of the nature of the literature recording these observations and because some were by word of mouth from our colleagues, we may have omitted reference credit to many who wrote of them before us. For this we apologize. Our greatest debt, of course, is to Sir Arthur Conan Doyle and to his teacher, Dr. Joseph Bell.

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